pain and functional limitation. Leptin levels were associated with degree of pain and functional impairment in both hip and knee OA, whereas for SF IL-6 and visfatin the association was observed in hip OA only.

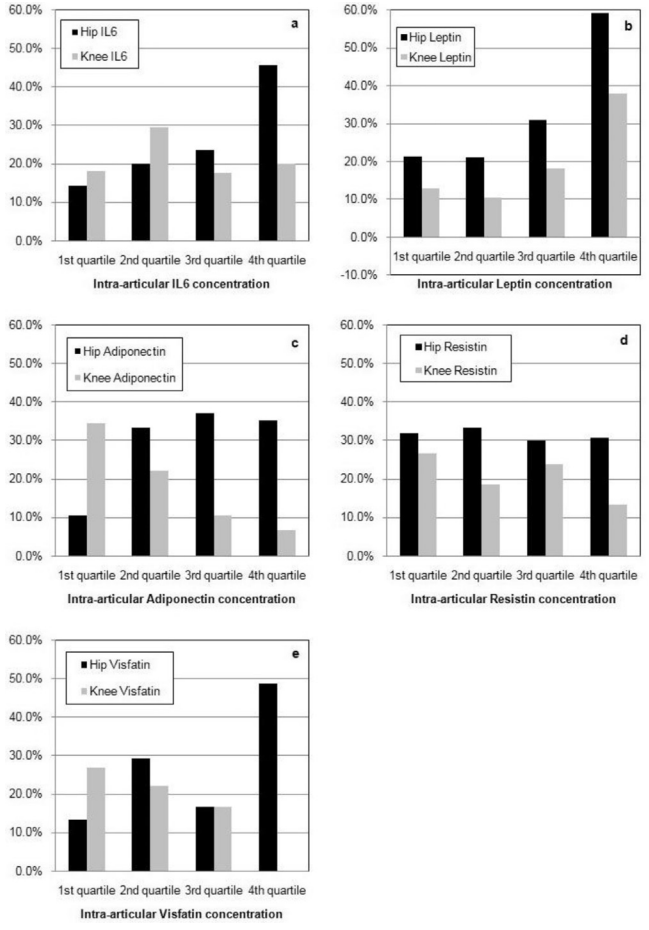

Figure 1. a-e. Proportion with highest WOMAC pain level (≤ 25) according to quartiles of synovial fluid adipokine concentrations

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GAIT IS DIFFERENTLY AFFECTED IN SUBJECTS WITH RADIOGRAPHIC OSTEOARTHRITIS COMPARED TO INDIVIDUALS WITH JOINT PAIN

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Purpose: Gait is an important indicator of health in the elderly, since several domains of gait are associated with the risk of falling and mortality. Hip and knee osteoarthritis (OA) are debilitating diseases which impair gait. It is unclear in the existing literature, whether joint destruction or joint pain is the most important factor in worsening of gait. Therefore, in the present study, we investigated gait patterns in individuals with radiographic knee or hip OA and in individuals with hip or knee pain irrespective of the underlying cause.
Methods: The subjects for this study are derived from the Rotterdam study, a large prospective, population based cohort of individuals of 45 years and older.
In 2257 subjects, gait was assessed by an electronic walkway in three walking conditions: normal walking, tandem and turning. The data was summarized using principal components analysis into seven, statistically independent, gait domains: Base of Support, Pace, Phases, Rhythm, Tandem, Turning, and Variability. Radiographic osteoarthritis was scored on weight bearing radiographs of the pelvis and knees using the Kellgren and Lawrence score. Chronic pain in the hip or knee (pain during most days of the week in the last 6 weeks) was derived from a pain mannequin.
Results: In a total of 2257 participants, hip osteoarthritis was present in 154 individuals and knee osteoarthritis in 400 individuals. Participants reported hip pain in 8.5% (of which 10.3% had radiographic hip OA) and for the knee in 16.4% (of which 29.3% had radiographic knee OA). Radiological hip OA was associated with Rhythm (0.27 per SD, *P*-value 0.001), Tandem (−0.25 per SD, *P*-value 0.005) and Turning (−0.28 per SD, *P*-value 0.003). Hip pain was associated with Rhythm (−0.17 per SD, *P*-value 0.027), Phases (−0.16 per SD, *P*-value 0.025) and Pace (−0.15 per SD, *P*-value 0.031). Both radiographic knee OA as well as knee pain did not show a significant association with the gait domains.
Conclusions: Radiographic hip OA and hip pain both alter gait. However they show a clearly different pattern of changes. Rhythm is affected in both radiographic OA and pain, but while individuals with hip OA tend to take quicker steps, individuals with hip pain take slower steps. Individuals with hip OA have more problems with tandem walking and turning, while individuals with hip pain have a longer double support time (phases) and shorter step length (pace). These findings suggest that gait assessment may be useful in clinical practice to discriminate between osteoarthritis or other pathology causing joint complaints and impaired locomotion.

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THE LEVEL OF ASSOCIATION BETWEEN PHYSICAL ACTIVITY AND SELF-REPORT DISABILITY IN OBESE AND NON-OBESE INDIVIDUALS WITH KNEE OSTEOARTHRITIS

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Purpose: The main objective of our pilot study was to investigate the effect of functional and physiological tests on the association between perceived levels of physical activity and self-reported disability in obese and non-obese individuals with knee osteoarthritis (OA).
Methods: Participants were a sample of 31 women and men between the ages of 50 and 80 years who were diagnosed with knee OA based upon radiographic examination evaluated by an orthopedic surgeon. Physical Activity (PA) was assessed using Metabolic Equivalents (METs) values of common physical activities classified as light, moderate, and vigorous intensity activity based on guidelines for exercise testing and prescription of the American College of Sports Medicine (ACSM). Disability was assessed using the Western Ontario McMaster University questionnaire (WOMAC). WOMAC scores were obtained before and after functional and physiological tests (e.g., the 6 Minute Walk Test, Timed Up and Go, stair climbing test, peak of oxygen consumption).
Results: Multiple Regression Analysis indicated that before (time 1) functional and physiological tests were performed, the coefficient of determination (R2) showed a weak level of association between PA and the WOMAC total score (R2 = .35; p = .008) and WOMAC pain (R2 = .027; p = .034), stiffness (R2 = .23; p = .065), and mobility (R2 = .36; p = .007) subscale scores. After (time 2) physiological tests were performed the coefficient of determination (R2) demonstrated moderate to strong levels of association between PA and the WOMAC total score (R2 = .63; $p < .0001$) and WOMAC pain (R2 = .50; p = .001), stiffness (R2 = .40; p = .003), and mobility (R2 = .66; $p < .0001$) subscale scores. Participants were then divided into two groups according to their BMI: obese and morbid obese (BMI = 30 kg/m2; ≥ 35 kg/m^2), or group A (N = 15), and healthy weight and overweight individuals (BMI = 18.5–24.9 kg/m^2; BMI = 25–29.9 kg/m^2), or group B (N = 16). Repeated Measures ANOVA indicated that the WOMAC total score ($p < .0001$) and the WOMAC pain ($p < .0001$), stiffness (p = .001) and mobility ($p < .0001$) subscale scores were significantly different between groups, with group A demonstrating higher WOMAC total score (mean = 57.5) and the WOMAC pain (mean = 11.3), stiffness (mean = 5.56) and mobility (mean = 40.56) as compared with group B WOMAC total score (mean = 35.1) and the WOMAC pain (mean = 6.6), stiffness (mean = 3.7) and mobility (mean = 24.7). The within-groups factor was significantly different from time 1 to time 2 for group A only: WOMAC total score (time 1 mean = 48.4 and time 2 mean = 66.6) and the WOMAC pain (means = 9.33 and 13.3), stiffness (means = 5.0 and 6.13) and mobility (means = 34.07 and 47.07). No significant changes in mean values were observed in group B from time 1 to time 2.
Conclusions: The WOMAC questionnaire is used to assess disability in individuals with OA; however, its use to predict disability in obese or morbid obese individuals seems to be enhanced when the questionnaire is applied right after functional tests had been performed.

Moreover, the intensity level of daily PA seems to be a strong indicator of disability in obese individuals with knee OA. Therefore, our pilot study suggests that the WOMAC should be used after one or more of the recommended functional performance tests such as walking, going up and down stairs, or from sitting to standing in order to obtain a more realistic self-reported disability score. It is also suggested that progressively increasing the intensity of PA in obese individuals may decrease their disability.

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IN ORDER TO EXPLAIN KNEE PAIN DUE TO OSTEOARTHRITIS, SHOULD WE START LOOKING FOR ANSWERS OUTSIDE OF THE KNEE JOINT?

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Purpose: To explain the variance in knee pain and perceived need for surgery (PNS) using psychological measurements of depression, anxiety and stress symptoms, physical activity, Body Mass Index (BMI) and Waist Circumference (WC) in obese and non-obese individuals with knee osteoarthritis (OA).
Methods: Participants were a sample of 31 women and men between 50 and 80 years old diagnosed with knee OA, based upon radiographic examination evaluated by an orthopedic surgeon, were pre-selected. Three different methods of radiographic examination (Kellgren and Lawrence, Ahlback and Cooke) were used to detect differences between groups. Depression was assessed using the Beck Depression Inventory (BDI). The BDI is a 21-item self-report instrument intended to assess the existence and severity of symptoms of depression. Depression, Anxiety and Stress Scale (DASS) was also used. The DASS is a 42-item self-report questionnaire divided in three scales designed to measure the negative emotional states of depression, anxiety and stress. Physical Activity (PA) was assessed using Metabolic Equivalents (METs) values of common physical activities classified as light, moderate and vigorous intensity activity based on guidelines for exercise testing and prescription of the American College of Sports Medicine (ACSM). Knee pain and PNS were assessed using a visual analog scale (VAS) after performance testes, such as 6 Minute Walk Test, Timed Up and Go, stairs climbing test and peak of oxygen consumption, had been performed. Participants were asked to score by pointing on a 10 cm line (0–10) their perceived level of knee pain. Likewise for PNS, participants were asked to indicate under the same scale their perceived need for surgery.
Results: Participants were divided according to their BMI into two groups: obese and morbid obese individuals (BMI = 30 kg/m^2; $\geq$ 35 kg/m2) or group A ($N = 15$) and healthy weight and overweight individuals (BMI = 18.5–24.9 kg/m^2; BMI = 25–29.9 kg/m^2) or group B ($N = 16$). An independent *t*-test between groups did not show any significant difference in radiographic OA, indicating that both groups had similar levels of knee OA severity. Our two correlation analysis between knee pain and radiographic OA and between PNS and radiographic OA did not show any significant correlation. Multiple Regression Analysis, from a sample of 31individuals, indicated that BDI had the highest correlation with PNS ($r = .71$; $p < .0001$) and the coefficient of determination (R2) of the model was R2 = .62 ($p < .0001$). Our second Multiple Regression Analysis used a sample of 46 individuals including group A ($N = 15$), group B ($N = 16$) and healthy controls ($N = 15$). While excessive weight measured by BMI and Waist Circumference showed strong and significant correlations ($r = .64$; $p < .0001$) and ($r = .69$; $p < .0001$) with knee pain, our results indicated again that BDI had the highest correlation with knee pain ($r = .77$; $p < .0001$) and the coefficient of determination of the model was R2 = .75 ($p < .0001$).
Conclusion: Notwithstanding the importance of radiographic findings to diagnose knee OA, our study did not show any significant correlation between radiographic OA and knee pain and PNS. Knee pain, due to OA, is the predominant symptom of OA and is the general reason why people decide to undergo total knee replacement surgery. Our study emphasizes the relevance of a more comprehensive understanding of pain complaints to improve our ability to identify individuals with knee OA and to apply rational treatment strategies, thereby offering a relevant target for intervention.

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THE IMPACT OF GASTRIC BYPASS SURGERY COMPARED TO TOTAL KNEE ARTHROPLASTY FOR OSTEOARTHRITIS ON KNEE SYMPTOMS

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Purpose: Marked associations have been reported between elevated body mass index (BMI) and symptomatic knee osteoarthritis (OA). While total knee arthroplasty (TKA) provides reliable symptomatic improvement in a majority of patients with end-stage OA, physicians are frequently consulted concerning patients with knee pain who lack intra-articular pathology amenable to surgical intervention. Bariatric surgery has been demonstrated to provide significant reduction in BMI in appropriately selected individuals, although there is limited evidence concerning the impact of this procedure on knee symptoms. The purpose of the present study was to assess the impact of bariatric surgery on patient-reported knee symptoms, and to compare findings to changes in a matched group of patients who underwent TKA for OA.
Methods: Patients who underwent laparoscopic roux-en-y gastric bypass surgery (LRYGB) at a single center between April and August 2011 were assessed as part of a prospective cohort study. Twenty LRYGB patients (16 women and 4 men) with a mean age of 52 years (range, 45–65 years) and mean pre-operative BMI of 45.6 kg/m^2 (range, 34.6–64.3 kg/m^2) were included. Forty patients who underwent TKA for symptomatic OA at the same center were selected, matched 2 to 1 by age ($\pm$5 years), gender (exact), and BMI ($\pm$2). The mean age was 56 years (range, 45–67 years) and the mean pre-operative BMI was 44.6 kg/m^2 (range, 34.1–64.9) ($p = 0.495$ for difference between cohorts). In both groups, knee symptoms were assessed pre-operatively, as well as at 6 months and 1 year following surgery, using the Western Ontario and McMaster Universities (WOMAC) Osteoarthritis Index pain and physical function scales. Six month and 1 year absolute and percentage change scores were evaluated and compared. Clinical outcomes for the LRYGB cohort were further stratified by presence ($n = 10$) or absence ($n = 10$) of self-reported OA.
Results: Bariatric surgery patients reported significant improvements in knee pain (mean score: 7.0 vs. 2.3 points; $p < 0.001$) and physical function (mean score: 21.4 vs. 7.1 points; $p < 0.001$) from pre-surgery to 1 year post-surgery. Compared to patients who underwent TKA, the mean percentage improvement in pain scores was similar between the two groups at both 6 month (50% LRYGB vs. 58% THA; $p = 0.387$) and 1 year follow-up (63% LRYGB vs. 68% TKA; $p = 0.493$). The LRYGB cohort experienced a significantly greater percentage improvement in physical function at 6 month follow-up (66% vs. 47% $p = 0.046$), and the difference was maintained at 1 year, though marginally non-significant (68% vs 52% $p = 0.084$). Comparatively, LRYGB patients with self-reported OA had greater knee pain and worse function pre-operatively when compared to those without OA, as well a smaller percentage improvement in pain (64% vs. 74%) and function (66% vs. 73%) scores at final follow-up.
Conclusions: Bariatric surgery provides significant improvements in patient-reported knee pain and physical function up to one year following surgery, although the effect on patient-reported outcomes was somewhat less in those who reported concurrent OA. The relative improvement in symptoms was similar to that of a matched group of patients who underwent TKA for end-stage OA. While further work is needed to better delineate the contribution of elevated BMI to knee symptoms, physicians should consider bariatric consultation for obese patients with knee symptoms lacking focal or degenerative pathology amenable to surgical management.

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CORRELATING HISTOLOGICAL CHANGES TO BEHAVIORAL CHANGES IN A RODENT MODEL OF POST-TRAUMATIC KNEE OA

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Purpose: Debilitating osteoarthritis (OA) symptoms do not always reflect radiographic indicators of joint degeneration; and, establishing a relationship between joint degeneration and symptoms in OA has been challenging to study in humans, perhaps due to the limits of assessing